RIDEWELL SUSPENSIONS

The Engineered Suspension Company

RAR-240 Series

Trailer Air-Ride Suspensions Owner's Manual



P.O. Box 4586 • Springfield, MO 65808 • 417.833.4565 • 417.833.4560 (fax)



Suspension Identification:

Ridewell Suspensions are identified by a metal tag attached to the left-hand hanger that indicates part number, revision level, & serial number.

Parts:

For optimum suspension performance, order only Ridewell parts. Replacement parts for RAR-240 are shown on pages 13-16 of this manual.

Sales, Service & Warranty:

If you need assistance regarding this product, please contact us and we will be glad to help you.

Mailing Address

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Pre-Installation Notes

- 1. Suspensions are designed to operate within specific parameters. Operating the suspension outside the design paramaters may result in improper performance, damaged equipment, and voiding of the warranty.
- 2. The total operating capacity of a suspension / running gear system is determined by the component with the <u>lowest</u> road rating. Please consult with the manufacturers of axles, brakes, tires and wheels to determine the maximum suspension system capacity.
- 3. The installer is responsible for ensuring that air volume requirements are met. Consult Federal Motor Vehicle Safety Standards (FMVSS) 121 for more information.
- 4. Welding or altering suspension components is not permitted except where publicly stated by Ridewell Corporation.



Configuration

The Ridewell model RAR-240 suspension is designed to accommodate a range of ride heights for each specific model and can be used on a variety of axle types for various applications. The following characteristics are commonly referenced for set-up of the suspension:

1. **<u>Ride Height (also called Mounting Height)</u>** - The distance from the bottom of the trailer frame to the centerline of the axle. Ride height is related to frame height (the distance from the bottom of the frame to the ground) by the following formula:

Ride Height = Frame Height - Loaded Tire Radius

The loaded tire radius for common tire sizes can be found in **Chart 1**.

2. <u>Beam Centers</u> - The centerline-to-centerline distance from one axle seat to the other. For the RAR-240, this is also the same as the

centerline-to-centerline distance from one hanger to the other. The RAR-240 is designed to fit up onto standard I-beam trailer frames at beam centers that correspond to standard axle track widths as shown below with standard wheel-end equipment. Installation at wider beam centers will reduce suspension clearances; installation at narrower beam centers will de-rate the axle beam capacity per the axle manufacturer's specifications. For non-standard beam centers, frames, frame centers, axle track or wheel-end equipment, the installer is responsible for verifying clearances, axle capacity, proper fit-up, and any additional required support structure.

Standard Trailer Dimensions

Trailer Width	Axle Track	Frame Centers	Beam Centers	Air Spring Centers
96″	71.5″	38″	35″	31"
102″	77.5″	44"	41"	37″

Installation - General

- 1. See the applicable RAR-240 engineering drawing for all dimensional requirements, part numbers, assembly details, torque values, etc. referred to in the installation procedures.
- 2. The exact sequence of installation and assembly of the suspension, installation of the height control system, and completion of the axle alignment procedure is at the discretion of the trailer manufacturer.

TIRE LOADED RADIUS			
Tubeless	Metric	Static Loaded Radius	
	215/75R17.5	14	
8.5R17.5	235/75R17.5	14.5	
		1.5	
9R17.5	225/70R19.5	15	
10R17.5	245/70R19.5	15.5	
10117.5	243/10/(15.5	10.0	
	265/70R19.5	16	
	285/70R19.5	16	
	305/70R19.5	16.5	
8R22.5	255/70R22.5	17	
	245/75R22.5	17	
	235/80R22.5	17	
	275/70R22.5	17.5	
	LTOIT OT LL.O	17.0	
9R22.5	265/75R22.5	18	
	255/80R22.5	18	
	305/70R22.5	18.5	
10R22.5	295/75R22.5	19	
	275/80R22.5	19	
11R22.5	295/80R22.5	19.5	
11022.0	315/80R22.5	19.5	
	285/75R24.5	19.5	
	275/80R24.5	19.5	
	385/65R22.5		

Chart 1

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Installation - Axle to Suspension

- 1. A fixture to support the axle and suspension during the welding process is recommended. Ridewell offers weld fixture 953386.
- 2. Verify the beam centers and center the axle in the axle seats.
- 3. For drum brake axles, space the cam off the tail of the beam per the drawing and ensure that the brake chamber brackets are oriented properly. For disc brake axles, ensure that the caliper assemblies are oriented properly and are rotated to proper position.
- 4. Check the gap between the axle and the bottom of the axle seat at each end of each seat. No gap greater than 1/16" allowed before clamping. After clamping the axle into the axle seats, no gap is allowed.
- 5. Weld the axle to the suspension trailing arms per Ridewell Weld Process #1 (see page 12).

Installation - Suspension to Frame

Note: The procedure in this section is recommended by Ridewell. Minor deviations from these guidelines are permitted, especially in the details of welding the suspension to the trailer. The installer has ultimate responsibility for attachment of the suspension to the trailer.

- 1. Locate and mark the proper location of the suspension hangers and air spring plates on the trailer frame. The frame must be clear in this area for proper suspension fit-up.
- 2. Frame cross members should be located as shown on the drawing.
- 3. Fabricate filler plates approximately as shown on the drawing and weld to the crossmembers with ¹/₄" fillet welds (it is recommended to place welds down the length of the crossmember, not across it) and butt weld to frames. At the hanger, a single large filler plate in place of the two small ones may be preferable.
- 4. Locate and weld the hangers to the frame and filler plates with ¹/₄" fillet welds. Stop welds approximately ½" from corners and edges. A 1.5" diameter piece of pipe may be placed through the holes in the hangers during this step as a stabilizer and aligning aide.
- 5. Weld the air spring support plate to the frame and filler plate in similar fashion with 3/16" fillet welds.
- 6. If required, locate a crossmember (or diagonal braces) to the front of the hangers as shown on the drawing and attach with 1/4" fillet welds.
- 7. All welds to be 70 ksi min. tensile strength. GMAW or FCAW recommended.
- 8. Assemble air springs and shock absorbers per the drawing.



Axle Alignment

The RAR-240 suspension is equipped for simple, manual alignment of the axles. There is 1/4" of available adjustment at each hanger.

- Prior to alignment, ensure all the eccentric bolt pointing arrows are at the 12 o'clock position. See Figure 1.
- 2. Align the forward axle to the center of the kingpin to within $\pm 1/8$ ". See Figure 2.
- 3. Alignment procedure:
 - a. Loosen the 1.25" pivot nut and remove anti-turn washer if necessary.
 - b. To move the axle, turn the head of the eccentric bolt in the direction the axle is to be moved. Maximum movement of the eccentric bolt pointing arrow from the 12 o'clock position is to the 9 o'clock or 3 o'clock position. The eccentric bolt pointing arrow should never be pointing below horizontal.
 - c. With eccentric bolts at their final setting, install anti-turn washers over the bolt heads and weld to hangers. See **Figure 3**.
 - d. Torque the pivot nuts to 1,000 ft-lbs.
 - <u>Note</u>: Torque the pivot nuts with the suspension at ride height to prevent pre-stressing the rubber pivot bushing.
 - Note: It is imperative that the pivot nuts be fully torqued prior to placing the trailer into service. Failure to torque the pivot nuts will lead to slippage of the pivot joint, causing rapid wear of the hanger holes and the bushing sleeve, and ultimately leading to catastrophic failure of the suspension. A tag on the suspension and a label in the carton of parts are provided to specify the torque of all the suspension fasteners (see Figure 4). The label should be adhered to the trailer frame above the suspension. Warranty coverage of the suspension is void if the pivot nuts are not fully torqued.
 - e. Final check the alignment measurements and re-adjust if necessary.
- 4. Align the aft axle(s) to the forward axle to within $\pm 1/16$ " using the same procedure. See Figure 2.



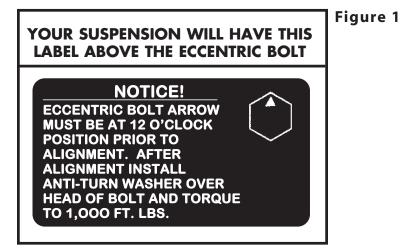
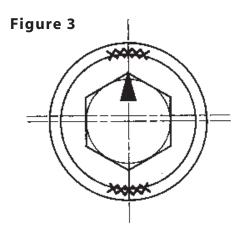


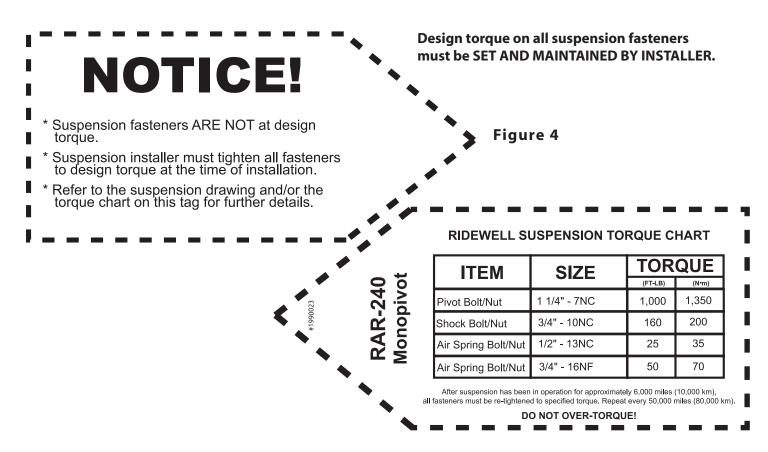
Figure 2



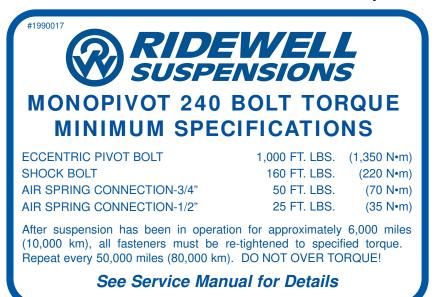
1/4" FILLET WELDS, 1" LONG, AFTER AXLE IS ALIGNED.



Torque Requirements



This torque label, included in the carton of parts, should be adhered to the chassis above the suspension.





Height Control System Installation

Install the appropriate height control valve, linkages, etc. per the Extreme AirTM Height Control Valve Installation and Operations Guide for model RAR-240.

Bushing Check Procedure

The bushings in the RAR-240 suspension should be checked during any scheduled maintenance or any time there is a suspected problem. Bushing problems can arise from breakdown of the natural rubber over time or, in a severe application, by failure of the bond between the rubber and the metal inner sleeve. The bushings should be checked if any of the following conditions are observed:

- 1. Uneven tire wear.
- 2. Abnormal forward-aft or lateral movement of the axle during operation.
- 3. Rapid degradation of wear washers.
- 4. Abnormal noises coming from the suspension.

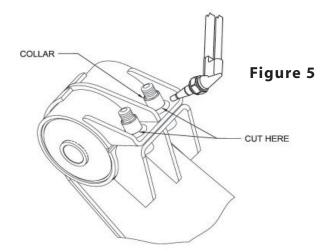
To check, insert the flat end of a pry-bar between the sidewall of the hanger and the eye of the beam. Applying moderate side load to the pry-bar, look for any relatively large or easy movement of the beam in relation to the hanger. Note that a small amount of movement under load due to deflection of the rubber is normal and acceptable. Repeat the process on the other side of the hanger. If large or easy movement is noted, drop the beams down per the bushing replacement procedure for further inspection of the bushing and replace if necessary.



Bushing Replacement Procedure

RAR-240 Underslung or Overslung Suspension

- 1. Raise and safely block up trailer and axle. Remove wheels and tires. Remove shock absorbers from suspension.
- 2. Deflate air springs and, if necessary, disconnect air control valve linkage.
- 3. Remove pivot nuts. Remove anti-turn washers from eccentric bolt heads by grinding away welds. Turn each eccentric bolt until arrow is pointing straight up and remove.
- 4. Rotate trailing arm beams down and out of hangers.
- 5. Inspect pivot holes and hanger surfaces for unusual wear or damage. Repair or replace components as required.
- 6. Remove Huckbolt[®] fasteners from bushing clamp by cutting off the collar with a torch as shown in **Figure 5**. Note: Huckbolt[®] fasteners will be replaced by conventional bolts, washers, and nuts included in the bushing replacement kit. Remove bushing assemblies.
- 7. Insert new bushing assemblies into the beam eyes. Install bolts, washers, and nuts as shown in **Figures 6-7**. Torque the nuts to 190 ft-lbs. minimum while making sure that the bushing remains centered in the beam eye. Ensure bushing clamp surfaces are closed "metal-to-metal." Final torque nuts to 280 ft-lbs.
- 8. Re-assemble beams to hangers with new UHMW polyethylene wear washers placed on the inboard sides of the beams. <u>Note</u>: Tanker Special suspensions have wear washers on both inboard and outboard sides of the beams.
- 9. Align bushing sleeves to hanger holes and install new eccentric bolts and nuts. It is recommended to coat the large diameter shank of the eccentric bolt with a thin layer of anti-seize compound. Take care to not get the anti-seize compound on the threads of the bolt or nut or under the head of the bolt.
- 10. Check axle alignment and re-align if necessary, per the "Axle Alignment Procedure." Install new anti-turn washers per **Figure 3.** Torque pivot nuts to 1,000 ft-lbs. with the suspension at ride height.
- 11. Re-install shock absorbers.
- 12. Re-install wheels and tires.
- 13. If necessary, re-connect air control valve linkage and adjust ride height per the Extreme AirTM Height Control Valve and Operations Guide.



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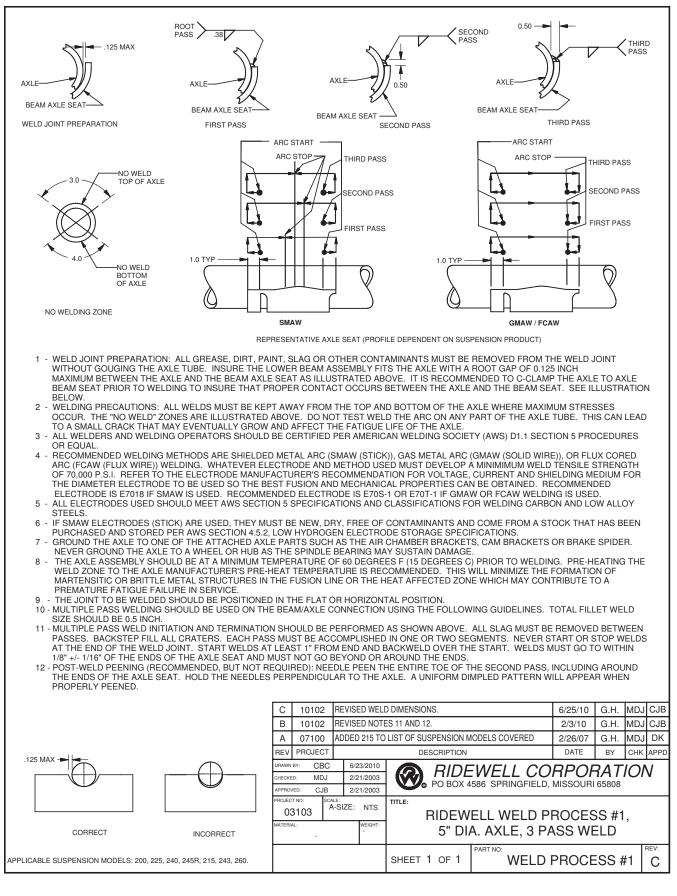
Bushing Replacement Procedure

RAR-240 Yoke Suspension

- 1. Raise and safely block up trailer and axle. Remove wheels and tires. Remove shock absorbers from suspension.
- 2. Deflate air springs and, if necessary, disconnect air control valve linkage.
- 3. Remove pivot nuts. Remove anti-turn washers from eccentric bolt heads by grinding away welds. Turn each eccentric bolt until arrow is pointing straight up and remove.
- 4. Rotate trailing arm beams down and away from trailer frames.
- 5. Inspect trailing arm pivot holes and bushing sleeve for unusual wear or damage. Repair or replace components as required.
- 6. Remove bushing assembly from bushing sleeve by grinding away the four welds on each end.
- 7. Install and center new bushing assembly into each bushing sleeve in frame. Clock seam in sleeve to $-45^{\circ} \pm 5^{\circ}$. See **Figure 8**. Weld one inch long at four places, both sides, equally spaced. Allow steel to cool between welds, to prevent damaging the bond between the rubber bushing and steel sleeve. Also, stagger welds to prevent head build-up and distortion by welding top of sleeve at outboard side of frame, then bottom of sleeve at inboard side of frame, and moving around the sleeve in 90° increments.
- 8. Re-assemble beams to frames with new UHMW polyethylene wear washers placed on both inboard and outboard sides of the bushing assembly. See **Figure 8**.
- 9. Align beam pivot holes to bushing sleeves and install new eccentric bolts and nuts. It is recommended to coat the large diameter shank of the eccentric bolt with a thin layer of anti-seize compound. Take care to not get the anti-seize compound on the threads of the bolt or nut or under the head of the bolt.
- 10. Check axle alignment and re-align if necessary, per the "Axle Alignment Procedure." Install new antiturn washers per **Figure 3**. Torque pivot nuts to 1,000 ft-lbs. with the suspension at ride height.
- 11. Re-install shock absorbers.
- 12. Re-install wheels and tires.
- 13. If necessary, re-connect air control valve linkage and adjust ride height per the Extreme AirTM Height Control Valve and Operations Guide.



Weld Process #1



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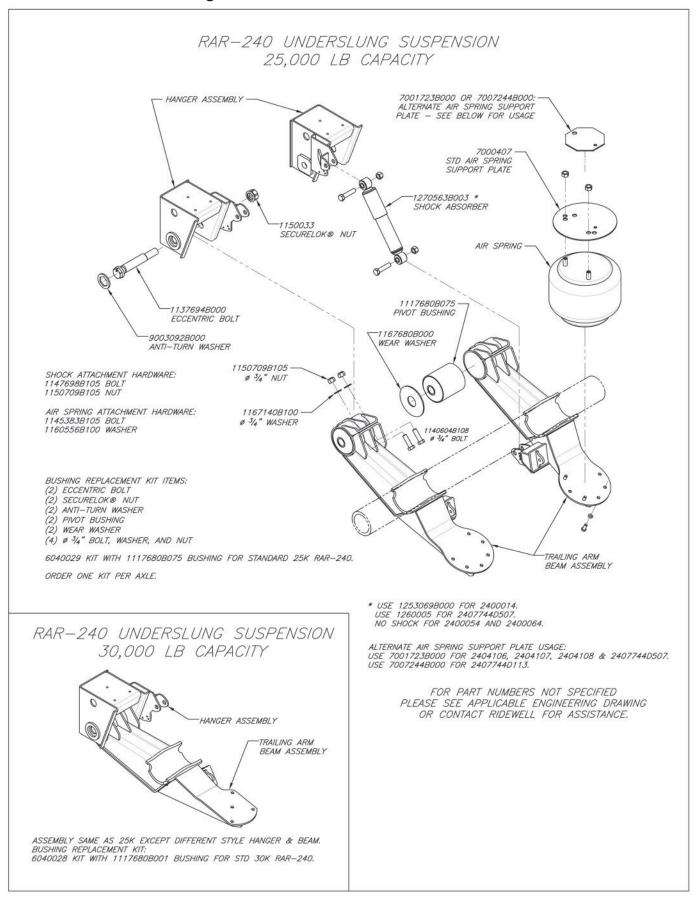


Figure 6 - Manufactured After 10-1-95



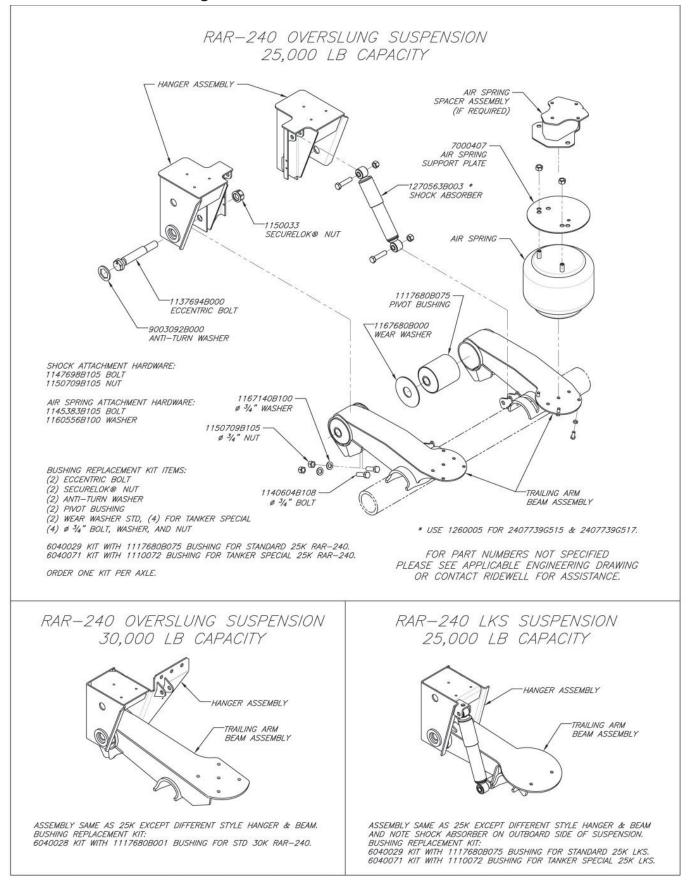
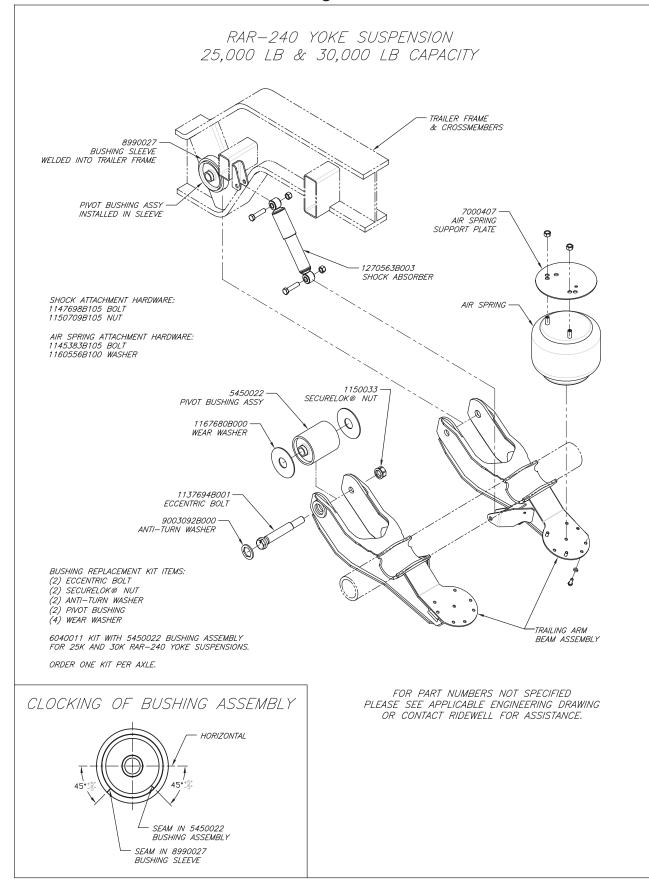






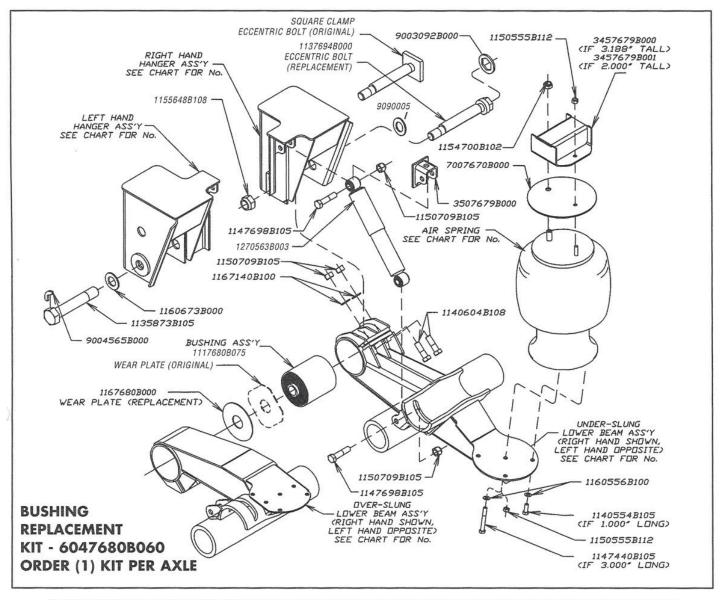


Figure 8





RAR-240 Manufactured Before 10-1-95 25,000 lb. cap., Overslung and Underslung Axle Seats



SUSPENSION PART NO.	LH HANGER ASSEMBLY	RH HANGER ASSEMBLY	LH ASSEMBLY BEAM COMPLETE*	RH ASSEMBLY BEAM COMPLETE*	AIR SPRING REPLACEMENT
			UNDERSLUNG BI	EAM ASSEMBLIES	
2407679D106	3267679B101	3267679B201	5977679B100	5977679B200	1003588802C
2407679D107	3267679B101	3267679B201	5977679B100	5977679B200	1003588802C
2407679D108	3267679B101	3267679B201	5977679B100	5977679B200	1003589082C
2407679D110	3267680B101	3267680B201	5977679B100	5977679B200	1003589082C
2407679D112	3267680B101	3267680B201	5977679B101	5977679B201	1003589082C
2407679D113	3267680B101	3267680B201	5977679B101	5977679B201	1003589101C
			OVERSLUNG BI	EAM ASSEMBLIES	
2407680D114	3267680B101	3267680B201	5977739B100	5977739B200	1001R13097G
2407680D115	3267680B101	3267680B201	5977739B100	5977739B200	1001R13097G
2407680D116	3267680B101	3267680B201	N/A	N/A	1001R13097G
2407680D117	3267680B101	3267680B201	N/A	N/A	1001R13097G

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*Includes Monopivot bushing and Huckbolt®pivot clamp fasteners factory assembled in welded beam component



Maintenance Schedule

To keep your Ridewell suspension in optimum working order, we recommend the following maintenance:

	Every 1,000 miles	First 6,000 miles of operation	Every 12,000 miles	Every 50,000 miles
Bushings				I
Air Springs	I			
Structure	I			
Ride Height	I			
Fastener Torque		Т		Т

I - Inspect, L = Lubricate, T = Tighten, R = Replace

Warranty

Ridewell Suspensions warrants the suspension systems manufactured by it to be free from defects in material and workmanship, under proper use, installation, application, and maintenance on highway trailers for a period of five (5) years with no mileage limit, after delivery to the original purchaser. The responsibility of Ridewell Suspensions under this non-transferable warranty is limited to making good at the company factory by repair or replacement of any part or parts which it manufactures.

Written permission for any claim return must be first obtained from Authorized Ridewell personnel. All returns must have transportation charges prepaid by the customer and accompanied with a complete written explanation of claimed defects and the circumstances of operational failure. On all component parts not manufactured by Ridewell, their warranty is to the extent that the manufacturer of such parts warrant them to Ridewell Suspensions. This is the only authorized warranty and is in lieu of all other expressed or implied warranties or representations, including any implied warranties of merchantability or fitness, or of any obligations on the part of Ridewell Suspensions. In no event will Ridewell be liable for business interruptions, loss of profits, personal injury, cost of delay, or for other special, indirect, incidental or consequential losses, costs or damages.

Subject to all of the above conditions, if repair or replacement of any defective part is made by Ridewell Suspensions, Ridewell will return the repaired or replaced part to the original purchaser with transportation charges prepaid.

- 1 36 months 100% Parts & Labor
- 37 60 months 100% Parts Only